

What Is Claimed:

1. A purified and isolated nucleic acid molecule selected from the group consisting of a nucleic acid molecule having a nucleotide sequence encoding human ICACC-1 (SEQ ID NO:6), a nucleic acid molecule which hybridizes to a nucleic acid molecule having SEQ ID NO: 1 and a nucleic acid molecule comprising functionally effective fragments thereof.
2. A purified and isolated DNA molecule having a nucleotide sequence encoding murine ICACC-1 (SEQ ID NO:2) or functionally effective fragments thereof.
3. A purified and isolated DNA molecule having a nucleotide sequence encoding human ICACC-2 (SEQ ID NO:4) or functionally effective fragments thereof.
- 10 4. The purified and isolated DNA molecule of claim 1, 2 or 3 wherein said DNA molecule is genomic.
5. A chemically synthesized DNA molecule having a nucleotide sequence encoding human ICACC-1 or functionally effective fragments thereof.
6. A chemically synthesized DNA molecule having a nucleotide sequence encoding murine
15 ICACC-1 or functionally effective fragments thereof.
7. A chemically synthesized DNA molecule having a nucleotide sequence encoding human ICACC-2 or functionally effective fragments thereof.
8. A purified and isolated RNA molecule having a nucleotide sequence encoding human ICACC-1 or functionally effective fragments thereof.
- 20 9. A purified and isolated RNA molecule having a nucleotide sequence encoding murine ICACC-1 or functionally effective fragments thereof.
10. A purified and isolated RNA molecule having a nucleotide sequence encoding human ICACC-2 or functionally effective fragments thereof.
11. A purified and isolated protein molecule having an amino acid sequence comprising
25 human ICACC-1 (SEQ ID NO:6) or functionally effective fragments thereof.
12. A purified and isolated protein molecule having an amino acid sequence comprising murine ICACC-1 (SEQ ID NO:2) or functionally effective fragments thereof.
13. A purified and isolated protein molecule having an amino acid sequence comprising human ICACC-1 (SEQ ID NO:4) or functionally effective fragments thereof.
- 30 14. A method of alleviating asthma by administering to patients in need of such treatment an effective amount of a compound to down-regulate the function of human ICACC-1.

15. A method according to claim 14 wherein the compound is a chloride channel inhibitor.
16. A method according to claim 14 wherein the compound is an aminosterol.
17. A method of alleviating asthma by administering to patients in need of such treatment an effective amount of an antibody that blocks the function of an ICACC thereby down-
- 5 regulating the activity of an ICACC-1.
18. The method of claim 17 wherein the antibody is produced from peptides that encompass the functional domains of ICACC-1.
19. A method according to claim 17 wherein the antibody is produced from peptides taken from the group of SEQ ID NO: 11-15.
- 10 20. The method of claim 17 wherein the antibody is monoclonal.
21. A method for detecting or diagnosing susceptibility to asthma associated with elevated levels of an ICACC-1 polypeptide in a human subject comprising the steps of:
- (a) measuring the level of the ICACC-1 polypeptide in a biological sample from said human subject; and
- 15 (b) comparing the level of ICACC-1 polypeptide present in normal subjects, wherein an increase in the level of ICACC-1 polypeptide as compared to normal levels indicates a predisposition to asthma.
22. A method for monitoring a therapeutic treatment of asthma associated with elevated levels of an ICACC-1 polypeptide in a human subject comprising; measuring the levels of
- 20 the ICACC-1 polypeptide in a series of biologic samples obtained at different time points from said subject undergoing therapeutic treatment wherein a significant decrease in said levels of ICACC-1 polypeptide indicates a successful therapeutic treatment.
23. A method of preparing an antibody specific to an ICACC polypeptide which comprises the protein molecule of claims 11 or 12 or fragments thereof comprising the steps of:
- 25 (a) conjugating an ICACC polypeptide which comprises SEQ ID NO:6 or SEQ ID NO:4 or fragments thereof containing at least ten amino acids to a carrier protein;
- (b) immunizing a host animal with said ICACC polypeptide fragment-carrier protein conjugate admixed with an adjuvant; and
- (c) obtaining antibody from the immunized host animal.
- 30 24. A method according to claim 23 wherein the protein fragment is taken from the group of SEQ ID NO: 11-15.

25. A method of quantifying an ICACC polypeptide of claims 11 or 12 comprising the steps of:

(a) contacting a sample suspected of containing the ICACC polypeptide with an antibody that specifically binds to the ICACC polypeptide under conditions that allow for the formation of reaction complexes comprising the antibody and the ICACC polypeptides; and

(b) detecting the formation of reaction complexes comprising the antibody and the ICACC polypeptide in the sample, wherein quantitation of the reaction complexes indicates the level of the ICACC polypeptide in the sample.

26. A method for identifying antagonists of an ICACC-1 comprising the steps of:

(a) obtaining non-human animals susceptible to airway hyperresponsiveness;

(b) administering antigens that induce airway hyperresponsiveness;

(c) comparing the characteristics of any resulting airway hyperresponsiveness with the characteristics of airway hyperresponsiveness obtained with pretreatment with a possible ICACC-1 antagonist agent; and

(d) selecting those agents for which pretreatment diminished the characteristics.

27. The method of claim 26 wherein the animal expresses human ICACC-1.

28. A method for identifying antagonists of an ICACC-1 comprising the steps of:

(a) obtaining a cell line that is responsive to IL-9;

(b) growing said cell line in the presence of IL-9;

(c) comparing the characteristics of IL-9 induction with those obtained with pretreatment with a possible ICACC-1 antagonist agent; and

(d) selecting those agents for which pretreatment diminished the characteristics.

29. The method according to claim 27 wherein the cell line is: murine lung epithelial cells transfected with the human IL-9 receptor or human NHBE cells.

30. Antisense DNA comprising the antisense sequence of a human ICACC-1 or active fragments thereof.

31. A method according to claim 14 wherein the compound is the antisense DNA of claim 30.

32. A method of treating cystic fibrosis by administering to patients in need of such treatment an effective amount of a compound to up-regulate the function of a human ICACC.

33. A method of treating inflammatory bowel disease by administering to patients in need of such treatment an effective amount of a compound to up-regulate the function of a human ICACC-1.

34. A method according to claims 32 or 33 wherein the compound is IL-9.

5 35. A method for detecting or diagnosing susceptibility to inflammatory bowel disease associated with reduced levels of an ICACC-1 polypeptide in a human subject comprising the steps of:

(a) measuring the level of ICACC-1 polypeptide in a biological sample from said human subject; and

10 (b) comparing the level of ICACC-1 polypeptide present in normal subjects, wherein an decrease in the level of ICACC-1 polypeptide as compared to normal levels indicates a predisposition to inflammatory bowel disease.

36. A method for monitoring a therapeutic treatment of inflammatory bowel disease associated with reduced levels of an ICACC-1 polypeptide in a human subject comprising;

15 measuring the levels of ICACC-1 polypeptide in a series of biologic samples obtained at different time points from said subject undergoing therapeutic treatment wherein a significant increase in said levels of ICACC-1 polypeptide indicates a successful therapeutic treatment.